NOTES ON *CARPHEPHORUS ODORATISSIMUS* (ASTERACEAE) IN PENINSULAR FLORIDA, U.S.A.

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ABSTRACT

Morphology, distribution, ecology and phenology for *Carphephorus odoratissimus* and *C. odoratissimus* var. *subtropicanus* are discussed and compared. *Carphephorus odoratissimus* var. *subtropicanus* is illustrated and evidence supporting varietal status is quantified. It occurs in a fire-maintained pine savanna-flatwoods/dry prairie landscape, where it is a conspicuous, perennial, autumn-flowering forb, endemic to south and central peninsular Florida.

RESUMEN

Se discute y compara la morfología, distribución, ecología y fenología de *Carphephorus odoratissimus* y *C. odoratissimus* var. *subtropicanus*. *Carphephorus odoratissimus* var. *subtropicanus* se ilustra y se cuantifican las evidencias que apoyan su estatus varietal. Se da en una sabana/pradera seca de pinos mantenida mediante fuego, es una hierba perenne, otoñal, endémica del sur y centro de la península de Florida.

INTRODUCTION

Carphephorus sensu lat. (Asteraceae-Eupatorieae-Liatrinae) comprises seven species (Correa & Wilbur 1969), and one recently recognized variety (Wunderlin & Hansen 2001) of *Carphophorus odoratissimus*, all of which are endemic to the southeastern United States. Six of these taxa occur in Florida, of which five [*C. carnosus* (Small) C.W. James, *C. corymbosus* (Nutt.) Torr. & A. Gray, *C. paniculatus* (J.F. Gmelin) H. Hebert, *C. odoratissimus* (J.F. Gmelin) H. Hebert, and *C. odoratissimus* var. *subtropicanus* (DeLaney, N. Bissett & Weidenhamer) Wunderlin & B.F. Hansen] are known from peninsular Florida (DeLaney et al. 1999; Wunderlin 1982; Wunderlin et al. 1996; Wunderlin 1998; Wunderlin & Hansen 2001).

The circumscription of *Carphephorus* has been much debated (Hebert 1968; Correa & Wilbur 1969; Cronquist 1980; Cox 1998). Some authors (Hebert 1968; Correa & Wilbur 1969) include *Trilisa* and *Litrisa* within *Carphephorus*, while others recognize them as distinct genera (Cassini 1823, 1828; Robinson 1913; Gaiser 1954; James 1958; King & Robinson 1987; Bremer 1994). Evidence presented by both Hebert (1968) and Correa & Wilbur (1969) support the inclusion of *Trilisa* within *Carphephorus*. Most recent floristic works have adopted this broad definition of *Carphephorus* (Cronquist 1980; Godfrey & Wooten 1981; Long & Lakela 1971; Wunderlin 1982; Wunderlin et al. 1996; Wunderlin 1998).

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In the most recent taxonomic study of *Carphephorus* sensu lato (Correa & Wilbur 1969), *Trilisa* and *Litrisa* are included within *Carphephorus*. Since Correa and Wilbur (1969), no new taxa in *Carphephorus* were recognized until DeLaney et al. (1999), described *C. subtropicanus* DeLaney, N. Bissett, & Weidenhamer. Following DeLaney et al. (1999), Wunderlin and Hansen (2001) treated *C. subtropicanus* at varietal rank within *C. odoratissimus*.

Based upon field observations in the fall of 1995, there seemed to be two entities of *C. odoratissimus* within peninsular Florida. *Carphephorus* specimens from flatwoods and prairie habitats of south-central peninsular Florida seemed somewhat morphologically different from *C. odoratissimus*, as known to us from previous fieldwork in southern Alabama, southern Mississippi, southern Georgia, and the Florida panhandle. Subsequent field investigations and critical taxonomic study of *Carphephorus* conducted from 1995–1997 led us to conclude that the *Carphephorus* entity in south-central peninsular Florida was worthy of recognition. Since that time, our on-going (1998–2001) field investigations and taxonomic studies of Florida *Carphephorus*, particularly in the region of range overlap for *C. odoratissimus* and *C. subtropicanus* in central Florida, lead us to conclude that *C. subtropicanus* should be recognized as a variety of *C. odoratissimus*. In this paper we present ecological, geographical, morphological, and phenological evidence to corroborate Wunderlin & Hansen's (2001) recognition of *C. subtropicanus* at varietal rank. All our data on morphological characters are derived from field sampling of randomly chosen individuals in each of ten populations of these varieties scattered in central Florida. Both entities have mainly separate geographic ranges but intergrade where they are contiguous or overlapping; both exhibit slightly divergent but overlapping flowering phenology; and despite quantitative differences in mean values of vegetative morphology and numbers of flowers per head, they lack differences in achene and floral morphology; all these features are indicative of varietal rather than species level recognition. Phenotypically, *C. odoratissimus* var. *subtropicanus* is distinguished from *C. odoratissimus* var. *odoratissimus* by its lack of a coumarin (vanilla-like odor), shorter and narrower basal leaves, strongly clasping and entire stem leaves, broader and more diffuse inflorescence, and more flowers per head. An illustration of *Carphephorus odoratissimus* var. *subtropicanus* is provided in Figure 1.

TAXONOMIC RELATIONSHIPS

Carphephorus odoratissimus var. *subtropicanus* differs from var. *odoratissimus* most notably in leaf character and some inflorescence characters. Small (1933:1337) noted that "extreme forms" of *Trilisa odoratissima* (= *C. odoratissimus*) might represent two entities, "one with a strong coumarin odor, broad, clasping, coarsely toothed upper leaf -blades and slightly viscid involucres [var. *odoratissimus*], the other with only a faint coumarin odor, narrow entire

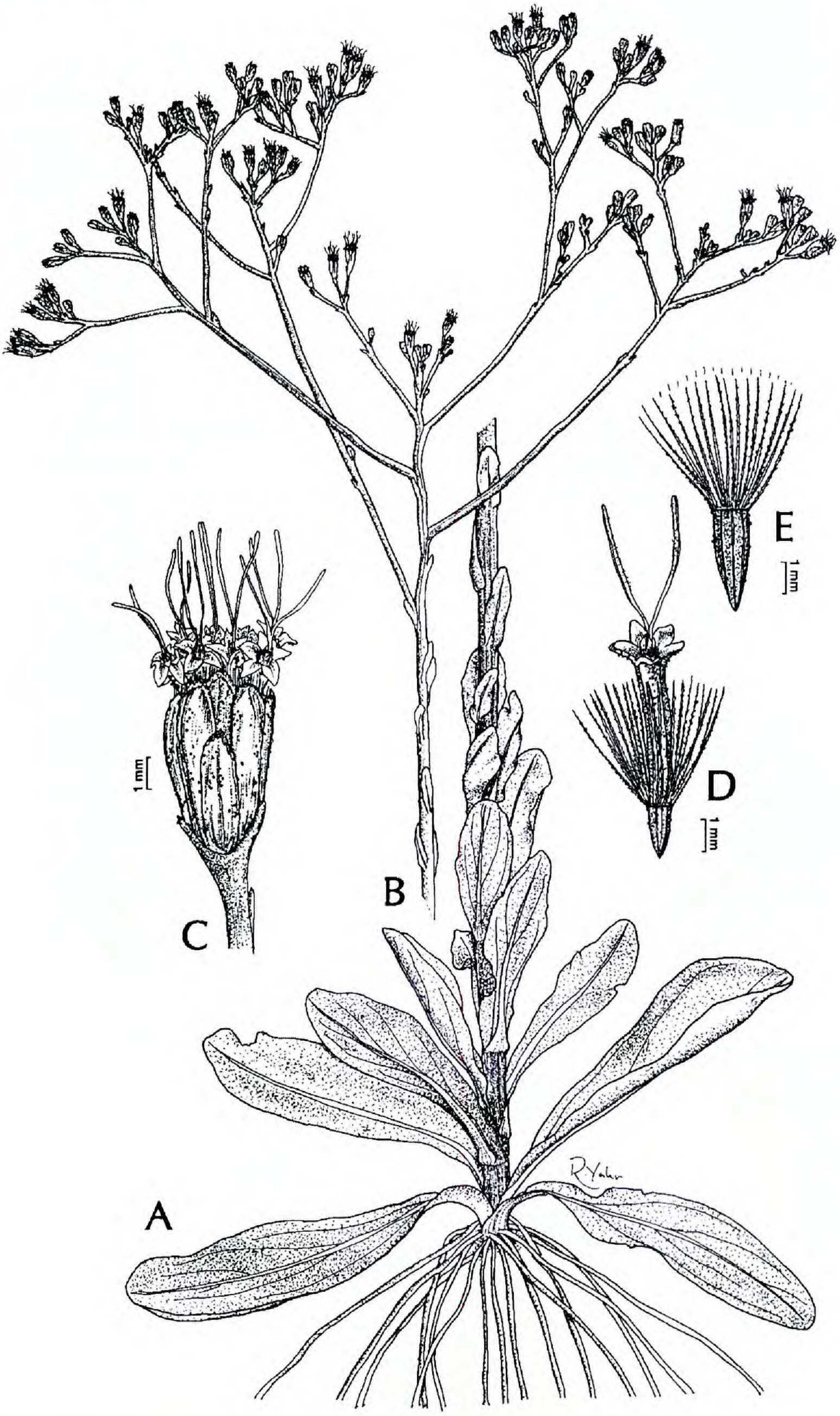

FIG. 1. *Carphephorus odoratissimus* var. *subtropicanus* drawn from *Orzell & Bridges 25,261*. **A.** Habit of base of plant; **B.** Inflorescence; **C.** Single head at anthesis; **D.** Floret at anthesis with pappus and achene; **E.** Mature achene with pappus.

upper leaf blades and very viscid involucres. Small never published the latter as a distinct taxon, and subsequent floristic workers have treated *C. odoratissimus* as a single entity. A revision of the genus (Correa & Wilbur 1969) also failed to account for the two as separate entities. According to Correa and Wilbur (1969), the type of *C. odoratissimus* is "presumably from the outer Coastal Plain of South Carolina ... which was the site of most of the species mentioned in Thomas Walter's *Flora Caroliniana*." Although this type has not been seen by the authors, the collection location is outside the range of *C. odoratissimus* var. *subtropicanus*.

There is considerable character overlap between the two *C. odoratissimus* varieties (Table 1). The presence of numerous quantitative differences in inflorescence and leaf morphology are the most divergent character states. However, the lack of major differences in achene and floral morphology indicates differentiation at the varietal level. One useful character is the average number of inflorescences per clump in well-developed plants. Most plants of *C. odoratissimus* var. *subtropicanus* have one or two flowering stems per clump (mean=1.6, std.=0.8), whereas in central Florida var. *odoratissimus* averages over twice as many inflorescences per clump (mean=4.1, std.=1.9). Several characters of the basal and stem leaves have different mean character states. Although there is wide variation in leaf size and shape between plants within a population in either entity and between lower and upper leaves on individuals, comparison of leaves in the same relative position on plants of the two varieties reveals consistent differences. The basal leaves of *C. odoratissimus* var. *subtropicanus* are both shorter (mean=11 cm) and narrower (mean=3.0 cm) than those of var. *odoratissimus* (mean length=19.8 cm; mean width=5.6 cm). The stem leaves of var. *odoratissimus* are broadly elliptic, and although the base of the leaf clasps the stem, the apex of the leaf is often divergent or flared away from the stem. The margins of the stem leaves in var. *odoratissimus* are often coarsely shallowly toothed. In contrast, the stem leaves of var. *subtropicanus* are narrowly elliptic, clasp the stem for their entire length, and typically have entire margins.

Other characters that differentiate the two varieties involve the size and branching pattern of the inflorescence. The inflorescence of var. *subtropicanus* is much broader than that of var. *odoratissimus*, and on well-developed mature plants it is almost always as broad as tall or broader than tall (height:width ratio mostly from 0.5:1 to 1:1). This difference is mostly attributable to the angle of branching of the primary inflorescence branches from the main axis. The inflorescence branches of var. *subtropicanus* diverge from the main axis at an angle of 30° to 45° and are often arcuate, resulting in a rather open and diffuse inflorescence. In contrast, the main inflorescence branches of var. *odoratissimus* diverge from the main axis at an angle of 10° to 20°, resulting in a narrower, taller, inflorescence that is typically taller than broad (height:width ratio from 1.5:1 to 3:1). This open, diffuse inflorescence, more diffuse than any other species

TABLE 1: Ranges of character states in selected populations of *Carphephorus odoratissimus*.

Character	var. *odoratissimus*	var. *subtropicanus*
Stem height	140–180 cm	50–150 cm
Stems per clump	1–9	1–5
Basal leaf length	17–24 cm	9–14 cm
Basal leaf width	4.5–6.8 cm	2.5–4.0 cm
Inflorescence height:width ratio	1.5:1 to 3:1	0.5:1 to 1:1
Lower stem leaf length	10–15 cm	4–11 cm
Lower stem leaf width	5–7 cm	1.7–4.0 cm
Midstem leaf length	2.2–4.5 cm	1.6–6.0 cm
Midstem leaf width	1.8–3.5 cm	0.8–2.4 cm
Flowers per head	(4–)7–10	(7–)10–14
Involucre height	4–6 mm	7–9 mm
Involucre width	2–3 mm	4–6mm
Achene length	2–2.5 mm	1.9–2.5(–2.8) mm

of *Carphephorus*, is a reliable field character but is often difficult to discern in dried herbarium specimens or plants with an immature inflorescence.

Differences in inflorescence, floral, and achene characters between the two varieties are minor. There is considerable variation even within an individual in the number of florets per head, size of heads, and size of floral parts. *Carphephorus odoratissimus* var. *subtropicanus* tends to have more florets per head (10–13) than is typical for var. *odoratissimus* (7–10). However, this could be attributable to the fact that most var. *subtropicanus* inflorescences consist of only 50–75 heads, in contrast to the hundreds of heads present in some inflorescences of var. *odoratissimus*; therefore a larger proportion of heads fully develop all of their potential florets. We can not find any consistent differences in achene length (1.9–2.5 mm) (–2.8 mm) for *C. odoratissimus* var. *subtropicanus* in comparison to var. *odoratissimus* (2.0–2.5 mm) or other floral characters between the two varieties. DeLaney et al. (1999) also noted overlap in achene length and number of florets per capitulum.

The following key can be used to distinguish the two varieties:

Plants with a strong odor of coumarin or vanilla; basal leaves usually more than 15 cm long and 5 cm wide; midstem leaves broadly elliptic, the apex flared away from the stem, the margins often shallowly toothed; inflorescence taller than broad (height:width ratio of 1.5:1 to 3:1), the primary inflorescence branches diverging from the main axis at a 10° to 20° angle; heads mostly with 7–10 flowers _____ **Carphephorus odoratissimus** var. **odoratissimrus**

Plants with very slight or no odor of coumarin or vanilla; basal leaves less than 15 cm long and 4 cm wide; midstem leaves narrowly elliptic, tightly clasping the stem, the margins entire; inflorescence broader than tall (height:width ratio of 0.5:1 to 1:1), the primary inflorescence branches diverging from the main axis at a 30° to 45° angle; heads mostly with 10–14 flowers _____ **Carphephorus odoratissimus** var. **subtropicanus**

DISTRIBUTION AND ECOLOGY

Carphephorus odoratissimus var. *subtropicanus* is endemic to central and southern peninsular Florida, where it has been collected from 21 counties (Fig. 2), an area encompassing approximately 50,000 sq. km (20,000 sq. mi). It is a conspicuous, autumn-flowering forb of burned pine savanna-flatwoods/dry prairie landscape throughout south-central Florida and is quite frequent in Highlands, Polk, and Okeechobee counties. In the western part of the peninsula, its range extends somewhat further north as compared to the eastern part of its peninsular range. In south Florida, *C. odoratissimus* var. *subtropicanus* is rather infrequent in Collier County, having been collected most frequently in scrubby flatwoods near Immokalee and historically from scrubby flatwoods at Marco Island, the only offshore island location presently known. In southeastern Florida it has been collected from flatwoods and prairies in St. Lucie, Martin, and northern Palm Beach counties. It is not known from the Everglades region of south Florida, presumably due to the absence of acidic pine flatwoods and prairies. There is an historical collection from a sandy low pineland in northern Miami-Dade County, presumably from sandy flatwoods that once occurred on the Atlantic Coastal Ridge.

Carphephorus odoratissimus var. *odoratissimus*, in contrast, is found throughout most of the southeastern United States coastal plain, from southeastern North Carolina south and west to southeastern Louisiana (Correa & Wilbur1969). It is quite common in northern Florida and in southern Georgia and Alabama, where it is typically found in upland longleaf pine (*Pinus palustris* Mill.) dominated woodlands and savannas. Throughout its range var. *odoratissimus* tends to be associated with sandy surface soils that are better drained than those for var. *subtropicanus*. *Carphephorus odoratissimus* var. *odoratissimus* does not occur in South Florida slash pine (*Pinus elliottii* Engelm. var. *densa* Little & K.W. Dorman) dominated flatwoods. However, ranges of both varieties overlap in central Florida. Here *Carphephorus odoratissimus* var. *odoratissimus* seems to reach its southern limit in ecotonal habitats on the lower sideslopes of sandy ridges, both associated with the Central Ridges in extreme northern Polk and Osceola counties and with coastal sand ridges in Brevard, Volusia, Citrus, and Hillsborough counties.

Carphephorus odoratissimus var. *subtropicanus* is characteristic of the pine-savanna flatwoods/dry prairie landscape of the Okeechobee, Osceola, and Desoto Plains (as defined by Cooke 1939; Schmidt 1997) in south-central peninsular Florida. Pine savanna-flatwoods and dry prairie occupy nearly level, inter-drainage flatlands on acidic, low nutrient, poorly drained sandy to sandy clay alfisol or spodosol soils (Abrahamson & Hartnett 1990; Bridges 1997; Orzell & Bridges 1997). Pine savanna-flatwoods are fire-maintained, open-canopied pine stands dominated in south-central Florida either by *Pinus palustris* or *P.*

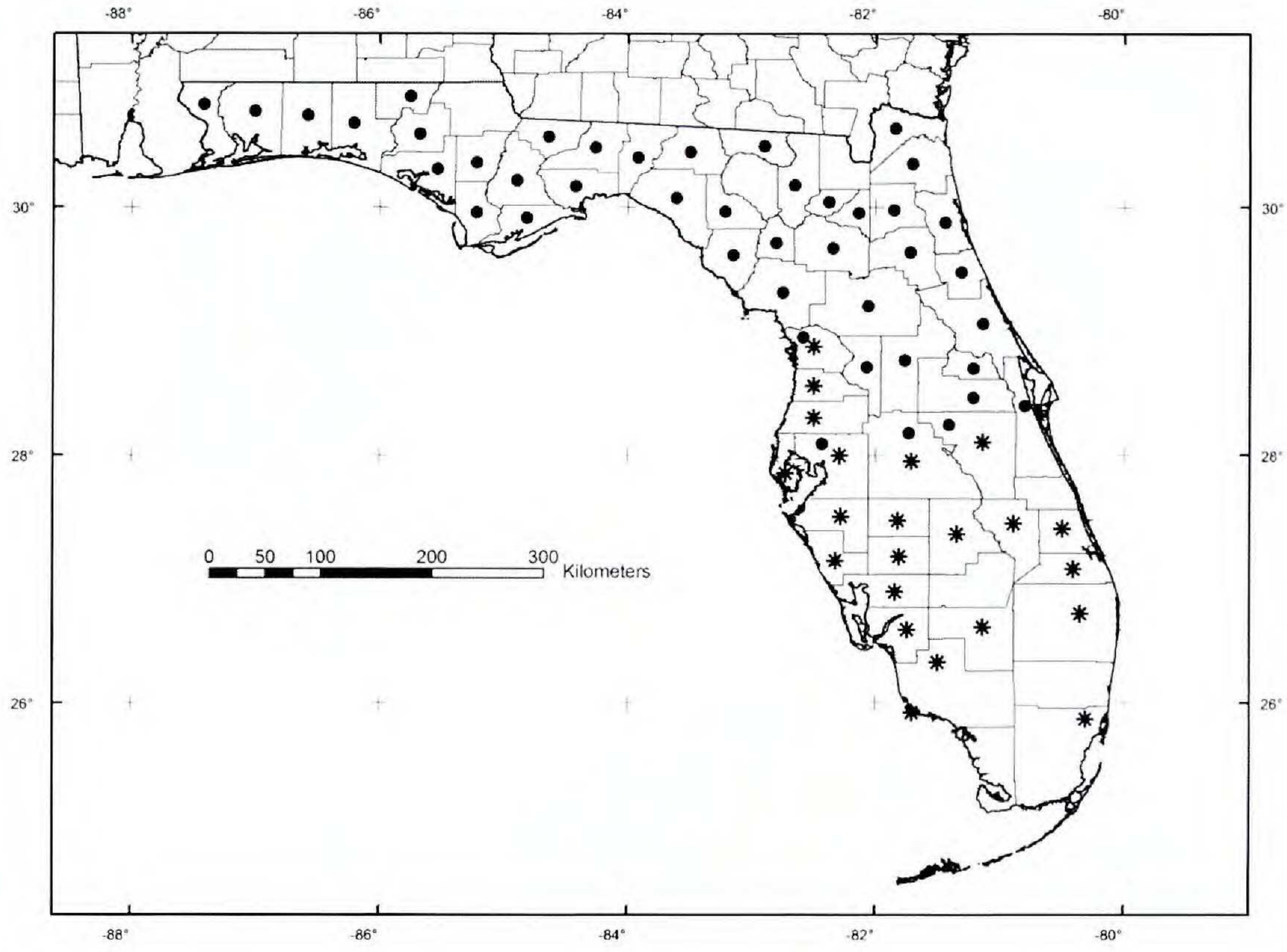

FIG. 2. Florida distribution of *Carphephorus odoratissimus* var. *subtropicanus* (stars) and var. *odoratissimus* (circles). Exact location within county is shown when species is restricted to a single or few locations in a county. For Collier County there are two stars, one for mainland and one for the only known island population on Marco Island. A symbol is placed in center of county when species is widely distributed throughout county. Distribution of *C. odoratissimus* var. *odoratissimus* extends beyond figure north of Florida to North Carolina and west to Louisiana.

elliottii var. *densa*, with *Aristida beyrichiana* Trin. & Rupr., *Serenoa repens* (W. Bartram) Small, and low-growing *Quercus minima* (Sarg.) Small typically dominant in the ground cover as well as numerous regionally endemic species that vary floristically between geographic regions (Orzell & Bridges 1997). Dry prairies are similar in ground cover composition to pine-savanna flatwoods but are naturally treeless. Historically, dry prairies had annual or biennial naturally occurring fires (Harper 1921, 1927; Orzell & Bridges 1999) and are the highest fire-frequented community type in central Florida (Orzell & Bridges 1999). Associated species that are endemic or near-endemic to peninsular Florida include *Asimina reticulata* Shuttlew. ex Chapm., *Polygala setacea* Michx., *Liatris tenuifolia* Nutt. var. *quadriflora* Chapm., *Rhexia nuttallii* C.W. James, *Bejaria racemosa* Vent., *Andropogon brachystachyus* Chapm., *Andropogon ternarius* Michx. var. *cabanisii* (Hack.) Fern. & Griscom, *Gymnopogon chapmanianus* Hitchc., *Phoebanthus grandiflorus* (Torr. & A. Gray) S.F. Blake, and *Polygala rugelii* Shuttlew. ex Chapm.

Carphephorus odoratissimus var. *subtropicanus* can be sympatric with any

of the four other *Carphephorus* species occurring in central Florida. It most often occurs with *C. corymbosus* at drier sites, *C. paniculatus* at mesic sites, and in very rare cases with *C. carnosus* at wet-mesic sites. *Carphephorus* odoratissimus var. subtropicanus is sympatric with var. *odoratissimus* at its northern (Polk and Osceola counties) and northwestern (Citrus and Hillsborough counties) range limits. Plants intermediate between the two are occasionally found in ecotonal and disturbed sites in central Florida where the boundaries of the two overlap. Where the two varieties are sympatric at a site in Osceola County, var. *subtropicanus* grows in dry-mesic poorly drained pine flatwoods, whereas var. *odoratissimus* is found on a somewhat poorly drained slight sandy rise between the pine flatwoods and a wetland depression.

PHENOLOGY

At a disturbed site in Orange County, specimens intermediate in characteristics (leaf morphology, inflorescence, and coumarin odor) between var. *odoratissimus* and var. *subtropicanus* were observed with both flowering in late September 1999. The co-habitation and overlapping flowering at the site of both varieties indicates that ecological separation of the two varieties is incomplete.

In 1997 at an Osceola County site, *C. odoratissimus* var. *odoratissimus* flowered from early September till late October, and *C. odoratissimus* var. *subtropicanus* flowered from late October into November. Elsewhere in central Florida, var. *odoratissimus* generally flowers from early to mid September into late-October and even earlier in north-central Florida (August thru mid-September), whereas var. *subtropicanus* flowers primarily from early to mid October thru early to mid November, with flowering having been noted in September at several locations. Plants flowering in early or late September were also noted by DeLaney et al. (1999). Furthermore, atypical flowering dates for var. *subtropicanus* (usually the result of burning followed by available soil moisture) have been observed. Flowering plants were collected on 2 April 1998 following a 19 August 1997 burn in Osceola County.

APPENDIX 1

Citations here are abbreviated, however full label data is available upon request from the authors, including detailed habitat and location information for the Orzell & Bridges collections.

Representative specimens of *Carphephorus odoratissimus* var. *subtropicanus*: **FLORIDA: Charlotte Co.:** 9 mi N of Placida, off SR 775 & Alt 45, 20 Oct 1977, *Fulton 35* (USF). **Citrus Co.:** SR 480, Chasshowitzka, 7 Oct 1972, *Genelle & Fleming 1606* (FLAS, USF). **Collier Co.:** off Hwy 82 W of Immokalee, 25 Sep1964, *Lakela 27406* (USF). **Miami-Dade Co.:** 7th Ave., N of Miami, 30 Nov 1946, *Ledin s.n.* (FLAS). **Desoto Co.:** oak scrub, ca. 1 mi W of Arcadia on FL 70, 29 Oct 1978, *Wunderlin, Arcuri & Hansen 6386* (USF). **Hardee Co.:** ca. 1 air mi S of Fort Green Springs, 9 Nov 1993, *Hansen & Wunderlin 12435* (USF). **Hendry Co.:** ca. 12.5 air mi SE of LaBelle, 21 Sep 1994, *Orzell & Bridges 23233* (FTG). **Hernando Co.:** ca. 1 mi W of Weekiwachee Springs, 15 Nov 1983, *S. Godley s.n.* (USF). **Highlands Co.:**

Sebring, 24 Oct 1945, *Brass 15613* (ARCH); dry-mesic, sandy, treeless flatwoods/dry prairie, Avon Park Air Force Range, 12 Nov 1997, *Orzell & Bridges 25261* (ARCH, BRIT, FLAS, FSU, MO, NY, TEX, USF). **Hillsborough Co.:** Flatwoods Park, ca.7 mi E of Lutz, 2 Oct 1994, *Wunderlin 10558* (USF). **Lee Co.:** Six Mile Cypress Preserve, 17 Oct 1997, *Bradley 791* (FTG). **Manatee Co.:** ca 1 mi N of Myakka River State Park, 17 Sep 1978, *Dodson 4798* (USF). **Martin Co.:** W of canal, S of Salerno jct. off US 1, 29 Sep1962, *Lakela 25383* (FLAS, USF). **Okeechobee Co.:** US 68, 15 mi N of Okeechobee, 19 Oct 1969, *McCart 11141* (FLAS, USF). **Osceola Co.:** ca. 12 air mi S of Kissimmee, 11 Oct 1997, *Orzell & Bridges 25237* (FLAS, USF); Three Lakes Wildlife Mgt. Area, 2 Apr 1998, *Orzell & Goldman 25263* (USF). **Palm Beach Co.:** Loxahatchee River Corridor, 1 Oct 1997, *Bradley & Woodmansee 559* (FTG). **Pasco Co.:** Upper Hillsborough Flood Detention Area, Zephyrhills, 15 Oct 1974, *Rochow s.n.* (USF). **Pinellas Co.:** Brooker Creek Preserve, 17 Nov 1993, *Hansen 12533* (USF). **Polk Co.:** N of Tick Island Slough, Avon Park Air Force Range, 9 Nov 1994, *Orzell & Bridges 23431* (FTG). **Sarasota Co.:** ca. 5 mi S of Venice, off US 41, 20 Sep 1961, *Lakela 24653* (FLAS, USF). **St. Lucie Co.:** Savanna State Reserve, along E-W track to W side of Savannas, 24 Sep 1992, *Garland 971* (FLAS).

Representative specimens of *Carphephorus odoratissimus* var. *odoratissimus*: **FLORIDA: Alachua Co.:** NW of Gainesville, 14 Sep 1978, *Dunn 171* (FLAS). **Bradford Co.:** 19 Oct 1977, *Conde s.n.* (FLAS). **Brevard Co.:** 16 Aug 1972, *Shuey M0345* (USF); N of Cocoa,11 Oct 1963, *Lakela 26595* (USF). **Calhoun Co.:** S of Blountstown, 28 Sept 1983, *Nelson 2988* (FLAS). **Citrus Co.:** Inverness,10 Nov 1982, *Mawhinney 40* (USF). Crystal River, 6 Jun 1941, *Murrill s.n.* (FLAS). **Dixie Co.:** N of Oldtown, 18 Aug 1937, *Arnold s.n.* (FLAS). **Duval Co.:** Fort Caroline Club Estates, 18 Aug 1963, *Creager 269* (FLAS). **Escambia Co.:** E of Pensacola, 20 Nov 1983, *Wilhelm 11852* (USF). **Flagler Co.:** Palm Coast, 4 Oct 1978, *Tabb s.n.* (USF). SE of Andalusia, 12 Oct 1979, *Hansen, Wunderlin, Sauleda, & Richardson 6719* (USF). N of Andalusia, 18 Apr 1940, *West & Arnold s.n.* (FLAS). **Gilchrist Co.:** E of Trenton, 10 May 1940, *Martin, DeVall & Arnold s.n.* (FLAS). **Hamilton Co.:** N of White Springs, 8 Oct 1966, *D'Arcy 1219* (FLAS). **Hillsborough Co.:** 21 Sep 1967, *Lakela 31111* (USF). **Holmes Co.:** W of Ponce de Leon, 28 Sep 1981, *Hansen 8906* (USF). E of Walton Co line on US 90, 23 Sep 1967, *Blum 2745* (USF). **Lake Co.:** Ocala National Forest, 3 Sep 1976, *Daubenmire s.n.* (USF). **Leon Co.:** Apalachicola National Forest, 29 Oct 1983, *Parker 1790* (USF). **Levy Co.:** vicinity of Cedar Key, 15 Sep 1971, *Carlton, Sreemadhaven, Lakela, & Long 3351*; (USF). Cedar Key Scrub State Reserve, 19 Oct 1990, *Amoroso 521* (FLAS). **Liberty Co.:** Apalachicola National Forest, 9 Dec 1988, *Gholson & Hill 20133* (USF). **Marion Co.:** Silver River State Park, 10 Sep 1990, *Buckner 111* (FLAS). **Okaloosa Co.:** N of Niceville, 26 Sept 1967, *Smith 1196* (FLAS). **Orange Co.:** W of Christmas, 11 Sep 1979, *Hansen & Richardson 6240* (USF). 10 mi S of Oakland, 7 Aug 1958,. *Kral 7745* (USF). **Osceola Co.:** W of Intercession City, 14 Aug 1981, *Hansen & Robinson 8478* (USF). **Polk Co.:** E of Haines City, 2 Sep 1968, *Conard s.n.* (FLAS). Lake Wales, 1 Oct 1964, *Conard s.n.* (FLAS). **Putnam Co.:** Welaka, 16 Jun 1939, *DeVall s.n.* (FLAS). **Santa Rosa Co.:** N of Hernandez Pt., 28 Nov 1980, *Wilhelm 8280* (USF). NE of Holley, 26 Sep 1967, *Smith 2003* (FLAS). **Seminole Co.:** Oviedo, 7 Sep 1947, *Schallert 6762* (USF). **St. Johns Co.:** Faver Dykes State Park, 29 Sep 1983, *Hansen 9857* (USF). W of Cresent Beach, 14 Oct 1941, *West & Arnold s.n.* (FLAS). **Sumter Co.:** Wildwood, 20 Sep 1981, *Correll & Correll 52625* (USF). **Taylor Co.:** US 27, W of Lafayette/Taylor Co. line, 12 Sep 1960, *Ward & Myint 2175* (USF, FLAS). E of Perry, 12 Aug 1956, *Knobloch 1429* (FLAS). **Union Co.:** S of Raiford, 22 May 1942, *West & Arnold s.n.* (FLAS). **Volusia Co.:** Near Ormond, 5 Aug 1943, *Butts s.n.* (USF). **Walton Co.:** S of DeFuniak Springs, 27 Sep 1967, *Smith 2006* (FLAS). **Washington Co.:** N of Chipley, 29 Jul 1954, *Ford 3682* (FLAS). **Alabama: Covington Co:** E of Wing, 20 Oct 1969, *Kral 38120* (USF). **Escambia Co:** Riverview, 27 Nov 1980, *Wilhem 8180* (USF). **GEORGIA: Thomas Co:** N of Boston, 3 Oct 1967, *Morton 2668* (USF). **McIntosh Co:** NE of Sapelo Island, 17 Sep 1956, *Duncan 20544* (USF). **LOUISIANA: Washington Par**: N of Hackley, 16 Sep 1983, *Taylor & Dutton 5618* (USF). **MISSISSIPPI: Harrison Co:** Pass Christian, 22 Oct 1954, *Demaree 36238* (USF). **Jackson Co:** Hurley, 27 Sep 1953, *Demaree 34398* (USF). **Pearl River Co:** I-59 exit 4, 22 Oct 1984, *Hermann 483* (USF). **SOUTH CAROLINA: Beaufort Co:** SE of Yemassee, 6 Sep 1956, *Bell & Ahles 17999* (USF). **Berkley Co:** S of Cross, 23 Sep 1966, *Bradley & Sears 3551* (USF).

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